

【CLAIMS】

【Claim 1】 A hybrid power supply system for driving a discharge lamp, the hybrid power supply system comprising:

5 a rectifier/filter having an input terminal connected to an external AC voltage, the rectifier/filter converting the external AC voltage to a DC voltage;

a piezoelectric inverter connected to the rectifier/filter, the piezoelectric inverter stepping up and converting the DC voltage to an AC voltage for driving the discharge lamp; and

10 a ferrite converter connected to the rectifier/filter, the ferrite converter stepping down the DC voltage to a rated DC voltage for driving discharge lamp circuits other than the discharge lamp,

the piezoelectric inverter including:

two first switching circuits having respective input terminals and a common output terminal;

15 a driver circuit electrically coupled to respective control input terminals of the first switching circuits, the driver circuit driving the first switching circuits;

at least one piezoelectric step-up transformer having a primary side electrically coupled to the common output terminal of the first switching circuits and a secondary side electrically coupled to the discharge lamp;

20 a sampling circuit electrically coupled to the discharge lamp, the sampling circuit detecting a current value of the discharge lamp and outputting a feedback signal;

25 a comparator circuit electrically coupled to the sampling circuit and a frequency control circuit, the comparator circuit comparing the feedback signal with a predetermined reference signal; and

the frequency control circuit electrically coupled to the comparator circuit and the driver circuit, the frequency control circuit controlling a switching frequency for the switching circuits according to an output signal of the comparator circuit,

30 the ferrite converter including a ferrite step-down transformer and a rectifier circuit,

the ferrite step-down transformer having a primary side electrically coupled to the output terminal of the switching circuits and a secondary side electrically coupled to the rectifier circuit,

5 the rectifier circuit electrically coupled to the secondary side of the ferrite step-down transformer.

10 **【Claim 2】** The hybrid power supply system according to claim 1, wherein the primary side of the ferrite step-down transformer is electrically coupled to the common output terminal of the first switching circuits and the respective input terminals thereof.

【Claim 3】 The hybrid power supply system according to claim 1, wherein the primary side of the ferrite step-down converter is electrically coupled to the common output terminal of the first switching circuits and the primary side of the piezoelectric step-up transformer.

15 **【Claim 4】** The hybrid power supply system according to claim 1, further comprising an additional AC-DC circuit electrically coupled to an input-side AC circuit, the comparator circuit, and the frequency control circuit.

20 **【Claim 5】** The hybrid power supply system according to claim 1, further comprising an additional DC-DC circuit electrically coupled to an input-side AC circuit, the comparator circuit, and the frequency control circuit.

25 **【Claim 6】** The hybrid power supply system according to any one of claims 1-5, wherein the ferrite converter further includes a buck regulator electrically coupled to the rectifier circuit.

【Claim 7】 The hybrid power supply system according to claim 1, wherein the ferrite converter includes:

30 a second switching circuit electrically coupled to the ferrite step-down

transformer, the second switching circuit driving the ferrite step-down transformer;
and

5 a secondary regulator circuit electrically coupled to the second switching
circuits and the rectifier circuit, the secondary regulator circuit feeding an output
voltage of the rectifier circuit back to the second switching circuit.

【Claim 8】 The hybrid power supply system according to claim 1, wherein the
comparator circuit is electrically coupled to an external brightness control signal.

10 【Claim 9】 The hybrid power supply system according to claim 1, wherein the
piezoelectric step-up transformer includes a Rosen type piezoelectric transformer,
a ring type piezoelectric transformer, or a ring-dot type piezoelectric transformer.